POPULAR MECHANICS

An Illustrated Weekly Review of the Mechanical Press of the World

"Tells you how to do things" Written so you can understand it

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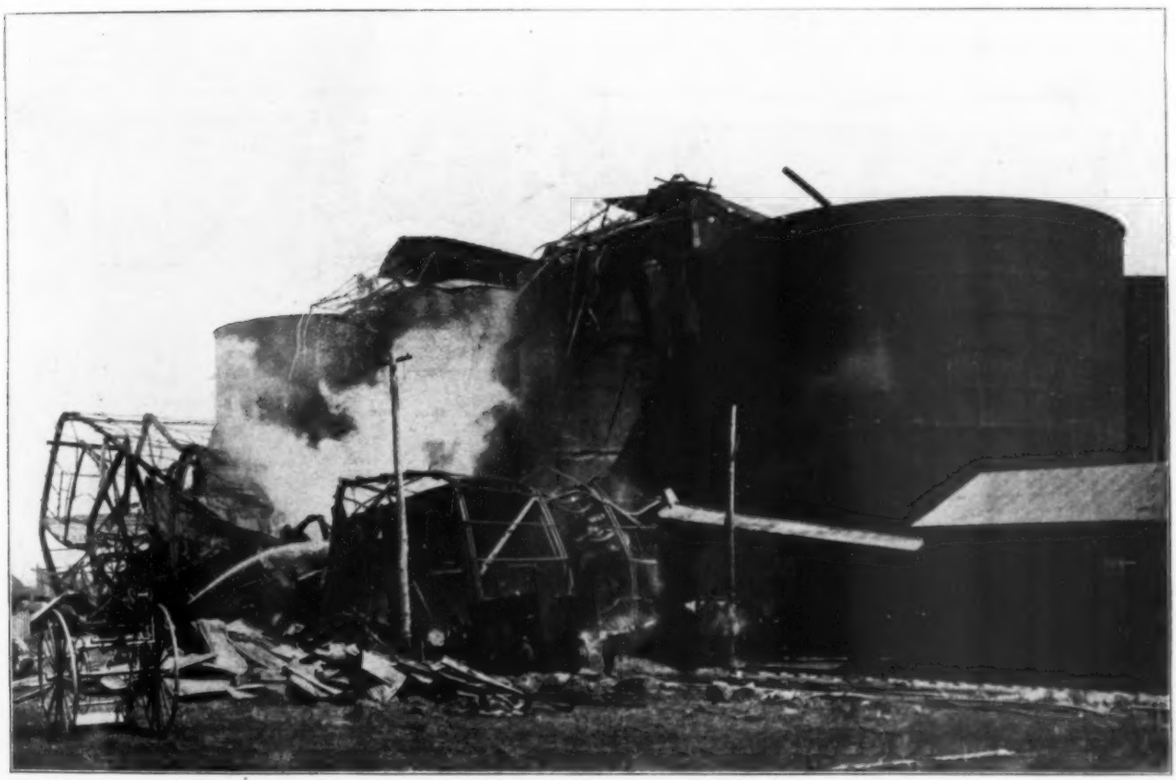
Smithsonian Institution

Burning of a Steel Fire-Proof Elevator



Remarkable Occurrence that Has Startled the Insurance World and Perplexed the Builders of the Great Modern Grain Storages

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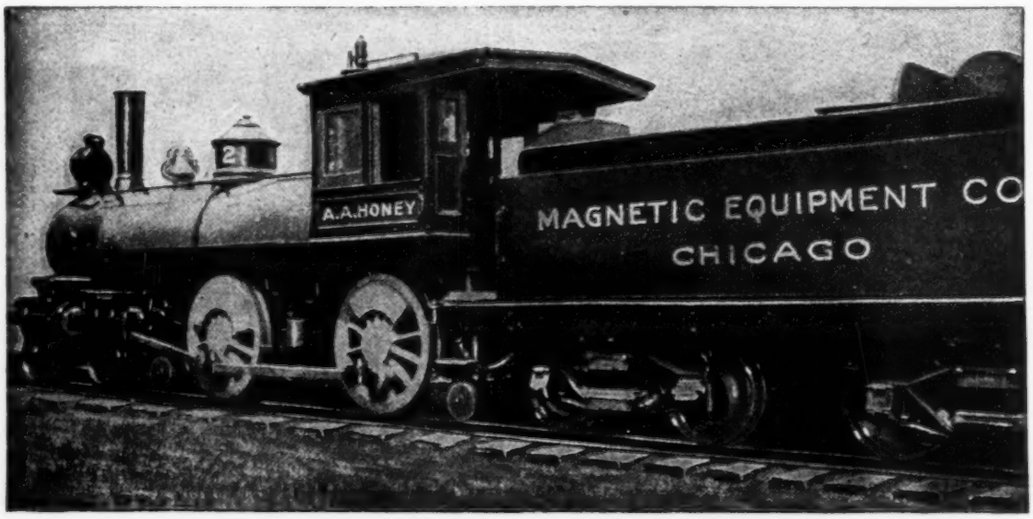
LIBRARY OF CONGRESS FEB 13 1903 SMITHSONIAN DEPOSIT

IN RE MAGNETIC EQUIPMENT COMPANY

On the Banking Floor of the Reaper Building, in the City of Chicago, is being exhibited the greatest invention of this age. Telephones, phonographs and wireless telegraphy are commonplace beside it. What would you think of a genius, who can put a simple appliance on an ordinary locomotive, by means of which it can drag a freight train up a mountain side, over a track steeper than the roof of any house; which can make a 40 ton locomotive pull a greater load than one weighing 120 tons; which can shut down a 60 mile an hour train, and tie it to the track, inside a car's length, which does away with the use of sand entirely, which can climb a grade, like a thing of life, steeper than the cog-wheel road up Pike's Peak; which hereafter will cheapen construction on all railways more than one-half; decrease the cost of transportation on all steam and electric lines; save millions in outlay—millions in shop expenses; millions in wear and tear; millions now lost in destructive derailings; save thousands of precious lives, now cruelly crushed out each year by frightful collisions; make railroad and street car travel almost absolutely safe, and earn **MILLIONS ANNUALLY FOR THE STOCKHOLDERS IN THIS GREAT ENTERPRISE.**



They have their own street car, their own locomotive. They are demonstrating that ice, snow, wet, frost, in fact nothing is an impediment. This means hundreds of millions saved annually. It means that the laws of this country will compel the adoption of these devices in order to save the lives of the traveling public on all street car and railway lines, and it means that holders of stock in this company will reap fortunes, for beside this all other industrial enterprises seem common-place.

Entire issue is common stock. Get in on the ground floor, and follow the course of the most stupendous enterprise of the age. Send one-tenth cash, balance in nine equal monthly installments. See subscription blanks. No interest, 30 days grace on payments. This plan will bring us all the money needed, and enable subscriber to take larger block, while stock is low. Join the greatest industrial revolution of the age. Some enterprises interest a part of the public, this interests all mankind, for it moves the dead freight of the business world.

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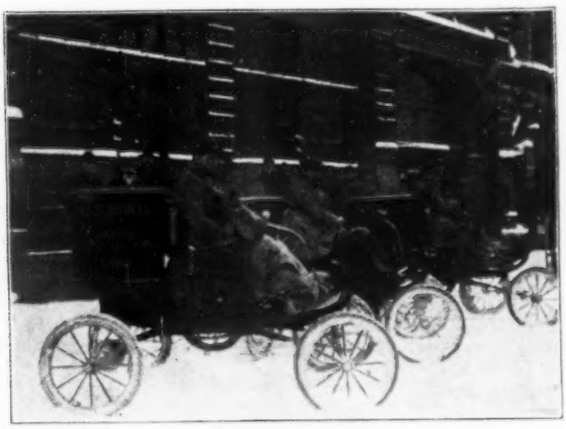
RUNABOUTS SAVE THE DAY IN CLEVELAND.

In Mail Collecting They Run Away From Horse Carts and Aid in Big Rush.

As a result of a demonstration of the efficiency of automobiles for mail collecting in Cleveland, Ohio, recently, the motor runabouts may be used to supplant the old-time horse-wagons entirely in that city. The runabouts saved the day there during a great holiday rush. They were tendered free of charge by the Olds Mobile Company and gratefully accepted by Postmaster Dewstoe. The machines were used exclusively in collecting packages and covered the heaviest routes in the heart of the city. They ran away from the



Autos that Ran Away from the Horses

horse-carts completely, leaving them plodding along at the same old gait, and often covered the route and back again three times before the horse-drawn vehicles had finished one delivery. They covered routes in two hours which required six hours under the old method. The postoffice officials at Cleveland are said to favor the change in that it would result in a great saving of time and money and a decided betterment of the service.

DEVICE TO LOCATE SUBMARINE DESTROYERS.

Sending Apparatus Invented by a Russian Has Caused a Naval Sensation.

Admiral Makarov, of St. Petersburg, Russia, has invented a device called the "radioson," which is causing a sensation in naval circles. By connecting the contrivance with the military telephone sytem the whole course of Whitehead torpedoes off Cronstadt was transmitted to an officer seated in a room in one of the government offices in St. Petersburg. The radioson will detect the submarine foe at night, in a storm, or in a fog at any distance as unerringly as in broad daylight or a dead calm. By a simple modification it can be made to blow up the enemy either automatically or at the will of a person who may be miles away. A squadron served by the radioson is practically invulnerable from unseen foes, for having been notified of their approach, it can either steam away or lie in wait and crush the enemy. The radioson consists essentially of a sending apparatus, which transmits sounds of very low intensity, and enables the man at the receiver to trace both distance and direction of the object emitting the sound.

IN THE YEAR 2,000.

"So you wish to marry my son, do you, young woman?"

Young Woman—"I do, madam."

"Well—er—is your income sufficient to support him in the condition of innocuous desuetude to which he has always been accustomed?"

The high water mark of the Mississippi river at St. Louis may be 250,000 cubic feet per second, or it may reach to nearly 1,000,000. The Nile never exceeds 450,000 cubic feet per second and seldom falls below 300,000 cubic feet per second during the period of flood.

STRANGE CONDITIONS IN DIGGING WORLD'S LARGEST TUNNEL.

Alps Shed Tears of Boiling Water on Workmen Who Are Boring Through Their Heart.

By Richmond Pearson, United States Consul General at Genoa, Italy

I have recently made a visit to the Simplon, in order to ascertain the character and progress of the stupendous undertaking of building the Simplon railway, whose success or failure means so much for the future of Genoa.

The work is progressing rapidly in the tunnel on both sides of the Alps; about 4,000 workmen are employed in the tunnel, and not less than 6,000 on the Italian section of the road between Iselia, at the mouth of the tunnel, and Arona, the present terminus of the railway running north from Milan. It is now practically certain that the road will be completed within the estimated time—that is to say, by July 1, 1905—as nearly two-thirds of the tunnel was finished on July 1, 1902, and the worst obstacles have already been met and mastered. The greatest of the impediments was the ever-increasing heat in the tunnel, caused by the growing volume of water, which, although it starts at the summit of the mountain, 6,000 feet above the line of railway, after percolating through beds of limestone, becomes almost boiling hot and flows into the tunnel at a temperature of from 112 degrees to 140 degrees F., rendering not only work but life impossible, without resort to artificial means of refrigeration. The engineer, by turning cold air on hot air and cold water on hot water, has reduced the temperature in the tunnel from 140 degrees to 70 degrees F.

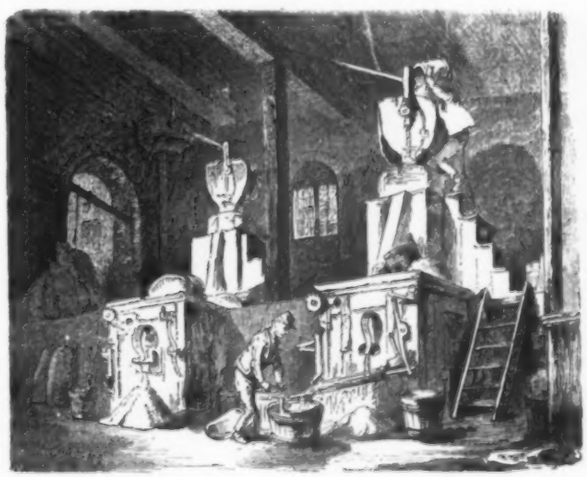
The volume of water flowing out of the south end of the tunnel is over 15,000 gallons per minute, and furnishes motive power sufficient not only to work the refrigerating apparatus, but to compress the air by which the drills are operated.

This tunnel, when completed, will be the largest in the world—to wit, 14 miles long, or twice the length of the Mont Cenis and 5 miles longer than the St. Gotthard. The cost of the tunnel alone will be $13,510,000, an average of nearly $1,000,000 per mile.

MILLING OF LONG AGO.

Our Ancestors Labored Hard to Make Breadstuffs in the Eighteenth Century.

Here is a model mill of the eighteenth century—a time when the miller's cough was universal among milling men. This mill is non-automatic; the material is shoveled from the attic down to the cleaner below, thence to the millstone and finally to the bolt, requiring an immense amount of labor.



Milling in the 18th Century

The American Miller says: "The grain is 'toted' up the short flights to the enormous hoppers. Imagine the state of a miller's back after a long day's work in such a mill. And in such a mill the amount of dust must have been frightful."

STEEL FIREPROOF ELEVATOR SUCCOMBS TO FLAMES.

Insurance World Startled by the Burning of the Canadian Pacific Storage at Fort William, Ont.

Is the modern steel elevator fireproof? This question was considered settled until the insurance world was startled by the destruction of the great steel elevator at Fort William, Ont. The front page illustration shows well the havoc wrought by the flames on this structure which was regarded by its owners as capable of withstanding any fire. The elevator before the fire, as shown in the accompanying cut, consisted of 24 lined steel tanks arranged in four rows side by side. Conveyor galleries above and below were used to carry grain to and from the tanks. The working part which was built very close to the tanks was a steel frame covered with corrugated iron. Its stairways and galleries were also of steel. It towered to a height of 140 feet, was 102 feet long and 42 feet wide.

The Grain Dealers' Journal, in explaining this disastrous conflagration, says: "The conditions surrounding this plant were unusually hazardous. Unlike most steel elevators, two of its legs had wooden sides, its wooden cleaning machines were mounted on wooden platforms. The working part of the structure where the fire occurred contained much dust and screenings. In fact, the house had never been equipped with dust collecting apparatus. The experience of recent years has proved beyond any measure of doubt that immunity from dust explosions and the rapid combustion of fine dust, approaching an explosion, can only be obtained by scrupulous cleanliness. Many cleaning houses have been sacrificed during recent years to dirt and dust explosions."

Canadian Pacific Elevator, As It Appeared Before the Fire

VALUES IN SCRAP METALS AND OLD RUBBERS

Americans, from the poorest up, are known to be extravagant, and what we throw away would make some nations rich. But we are beginning to make use of old things worn out and unfit longer for use. Old iron of all kinds is in greater demand than ever before, owing to the great increase in the use of that metal the past three years. The following is the present price per ton in Chicago for carload lots: Scrap iron, $16; burnt iron and grate bars, $10; old plows, $14; old boilers, uncut, $10, cut in sheets, $14; old gas pipes, $13, and old horseshoes, $15.

The other metals, like copper, lead, zinc, tin and antimony bring much higher prices, and are quoted by the pound; pewter, for instance, is worth 17 cents.

Old rags are quoted by the 100 pounds, and bring from 75 cents up.

Rubber is valuable, old garden hose being worth $20 a ton; old rubber shoes, 7 cents a pound; and bicycle tubing all the way from 5 to 22 cents per pound.

BERTILLION MAKES ARRESTS FROM FINGER PRINTS.

Famous French Detective Employs American Writer's Ideas to Effect an Important Capture.

M. Bertillion, the famous French detective, whose system of taking measurements of criminals has been adopted throughout the detective world, has added other laurels to his crown by employing the idea of the thumb print, which originated in Mark Twain's book, "Pudden-Head" Wilson, to cause the arrest and conviction of a noted French murderer.

A man had been killed in the Rue St. Honore. There was only one clew. In stealing some valuables which were in a glass case, the murderer had broken the receptacle. He had begun to pick up the pieces of glass and on one of them were the prints of his fingers. By using powerful electric lights and taking unutterable pains Bertillion finally succeeded in getting serviceable negatives of the finger prints. The thing to be done next was to find out if among the 300,000 photographs of the finger prints of criminals which he has made and filed away in the archives of the prefecture of police there was one that corresponded with the prints of the digits of the Rue St. Honore murderer.

He discovered that the finger prints pictures corresponded with those of a man named Scheffer, who had been in custody about a year before.

M. Bertillon hurried to the prefect and told him of his discovery. The prefect smiled—a little ironically, Bertillon thought. The expert became excited. Pulling out of his pocket notes worth 1,000 francs he announced that he would present them to Scheffer as an indemnity were he arrested and not found guilty.

The prefect, impressed, ordered his man, who previously had been on the trail of one "Georges," to find Scheffer and arrest him. The detectives' report showed that the man had left Paris hastily on the day following the Rue St. Honore crime. Then they discovered that he had been intimate with the murdered man—Reibel. Convinced now, the sleuths redoubled their efforts to hunt their quarry down, and finally succeeded in doing so.

Soon after being arrested, Scheffer confessed his guilt.

ACETYLENE AS A SHIP SAVER.

As a result of a successful experiment in raising a 10-ton boat by means of acetylene gas, it is now suggested that this agent may be used to prevent a ship from sinking. In other words, the ship would be made a great life saving buoy, just as inflated rubber belts are now used to save individuals, or rubber garments are worn which may be blown full of air in a few seconds.

A boat weighing 10 tons sank in the river Seine at Marly, France, and M. Ducasse, whose idea it was, was allowed to demonstrate his method, which he did with great success. He fastened great waterproof bags in and around the vessel, by means of a diver. In these bags were packages of calcium carbide, which when it comes in contact with water forms acetylene gas. When all was ready the necessary amount of water was let into the bags, when great quantities of the gas were instantly generated, filling the bags and raising the boat. The inventor now proposes to prevent sinking of vessels by collision at sea and from similar accidents by providing ocean-going ships with sealed packages of the carbide, which would keep a long time, but which could be converted into gas in a moment by a device of the inventor. The gas bags would fold up and occupy very little room until inflated by the gas.

ASSES' MILK AS A CUBAN DELICACY.

Places Where an American Dairy With Modern Mechanical Appliances Would Prosper.

By Raymond A. Pearson, M. S., Assistant Chief of the Dairy Division, Bureau of Animal Industry, U. S. Department of Agriculture.

In a few dairies in Cuba some advance has been made toward American methods; for instance, the cows may be milked twice daily, but even then the calves are usually allowed to assist.

A peculiar custom observed in Havana is that of using asses' milk, especially by the sick. Every morning numbers of female asses are driven through the streets and milked in front of houses for the purpose of serving the product fresh. A man or boy has charge of from two to six of these animals, which will give from one to three pints of milk each. The price of the milk is as high as 40 cents per pint, hence its use is greatly restricted. It is supposed to have much merit as food for the sick.

The milk business throughout the island is conducted in about the same manner as in Porto Rico. Near Havana a

Milk Asses of Cuba, From Raymond A. Pearson, U. S. Department of Agriculture

small dairy was visited where there were a dozen American grade Jersey and Holstein cows that had been brought from Texas. They were cared for by their owner, an American, and were yielding him good returns for his investment and labor. He reported a net profit of $200 on seven cows in four and one-half months. In Havana milk is commonly sold at 10 to 15 cents per litre (a little more than a quart). In Santiago the price is higher. One dealer was found to be using for a quart measure a bottle holding only seventeen ounces. In a dairy near Cienfuegos a complete milk bottling outfit was found. The milk was bottled and delivered without cooling as soon as possible after being drawn. But little butter is made in Cuba and it is generally inferior. It has been largely replaced by cheap oleomargarine from the United States.

Delivering Asses Milk in Havana, From Raymond A. Pearson, U. S. Department of Agriculture.

Cart for Carrying Milk to Havana, From Raymond A. Pearson, U. S. Department of Agriculture.

OFFICIAL REPORT ON "AUTO" TRAINS.

Matter Deemed of Such Importance That It Attracts the Government's Attention.

So important is considered the innovation of running automobile trains in London and Paris, mentioned in a previous issue of Popular Mechanics, that it has called forth a report from United States Consul Marshal Halstead at Birmingham. The cars to compose these new trains are called "autonomobile" carriages, that is, carriages that are both autonomous and motor cars. In his report Consul Halstead quotes from a high London authority as follows:

The system is one which, in an embryo form and dating back several years, has been applied to short and fast tramway lines, but never to practically unlimited distances. While not, perhaps, using the technical expressions which would be employed by a specialist, I believe I am not mistaken in stating that by means of the slightest possible quantity of petroleum the smallest possible quantity of water can be converted into the greatest propelling power of steam which can be produced. The extremely powerful vapor thus obtained acts directly on the wheels of the autonomobile. Of course the petroleum is consumed but the water, first transformed into vapor, condenses afresh, reverts to its original condition, and is then more easily transformed into steam, because it retains its heat. Thus, though the petroleum has disappeared, the water remains, which in temperate climates is of no inconvenience and in dry countries is of priceless value. Consequently, in front of every autonomobile is an apparatus producing with a liter of petroleum per kilometer (1.05 quarts per 0.62 mile) the steam power requisite for propelling the carriage with its 40 passengers and 2,640 pounds of luggage at a normal and almost minimum speed of 100 kilometers (62 miles) an hour, and that, too, without interruption, noise, or jerk. In order to overcome the air resistance which such a speed entails, the autonomobile in front and behind is so shaped as to cut the air, which thus becomes an auxiliary rather than an obstacle. As each autonomobile has its own apparatus, the carriages, of course, might go singly as easily as when coupled together. I may add that the weight of the apparatus, apart from the petroleum and water carried, is trivial. As to the latter, to go from Paris to Nice, 1,100 or 1,200 kilograms (290.5 or 317 gallons) of petroleum and 4,000 or 5,000 kilograms (1,056 or 1,321 gallons) of water will be required. This will allow of the whole journey being made without a stop; only care must be taken to guard against overheating.

ELECTRIC WIRE IN THE WHITE HOUSE.

There are in the White House 168,000 feet or 31 miles of electric wire, all of which is enclosed in iron conduits, each system of wiring being entirely distinct. The electric lighting equipment supplies current to 3,000 incandescent lights.

The shortage of the coal supply, whatever its cause, has directed renewed attention to an increasing use of the power of waterfalls, electrically transmitted to points of consumption.

An irrigation ditch near Stockton, Cal., known as the Stockton canal, waters 30,000 acres of land.

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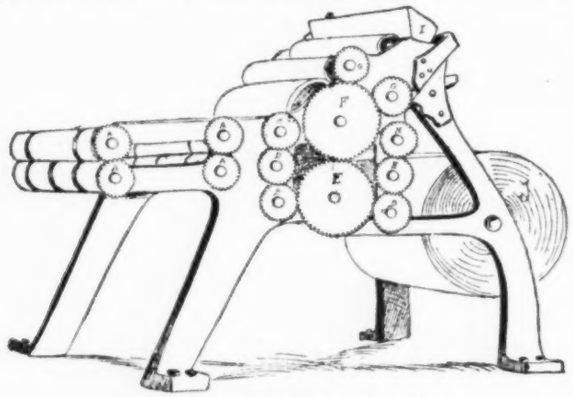
OFFICE BOY INVENTS WONDERFUL PRINTING PRESS.

United States Government Installs His Device in Weather Office at Columbus.

While employed as an office boy in the weather bureau office at Columbus, Ohio, young George Upton Harn conceived ideas for a printing press that may revolutionize printing machinery. Upton was vested with the work of addressing thousands of forecast cards daily, to be sent to all sections of



THE HARN ROTARY PRINTING PRESS.

A—Carriers.
B—Idlers for transmitting power.
C—Cutting roll.
D—Roll on which knife works.
E—Platen.
F—Bed cylinder containing type.
G—Composition ink rollers.
H—Draft rollers for receiving paper.
I—Ink fountain.
J—Paper roll.

Ohio. He thought the process was too slow, and so began to figure on an addressograph by which he might facilitate his work. When he had the plans of the new addressograph fairly mapped out in his mind, he saw that it would address the forecasts much faster than they could be printed. Then why not apply the same device, with some alterations, to the printing of the forecasts? The idea enlarged as the prospects revealed themselves and the United States government has approved of the plans that resulted. The first press of young Harn's invention has already been installed in the office of the Columbus weather station at the instigation of the government for the printing of the mammoth quantities of the forecasts and others will probably be constructed for the government printing stations in all parts of the United States, and in all our newly acquired possessions. The new press does more than double the amount of work of the old system in the same time.

The invention is known as the Harn Rotary Printing Press. It is something on the order of the large straight-line newspaper cylinder presses, but is small, simple, durable and cheap of manufacture. It is all built of steel castings except a few of the minor working parts, so that in all it will stand the rapid work that it is intended to do, and not be racked thereby. The machine stands only about 18 inches in height, 2½ feet long, 12 inches wide and will weigh about 250 pounds. It has tympan and type or form cylinders similar to other presses. To these, other cylinders, or rolls, are connected, which carry the paper to the printing apparatus, and from the printing cylinders to the paper knives and from the cutting device to the place of delivery, by a tape carriage, between specially covered rollers, rubber being used on the delivery roller or cylinder on account of its adhesive qualities and to keep the tension even.

The machine is fed from a roll of paper, the speed of which is controlled by a tension and works on a straight-line principle. A special inking device, similar to that on other presses is used. The ordinary composition inking roller will not be used on this machine, but in its stead some other material that will be better applied to the high speed of such a machine, and something that will be more durable. The composition of the new roller, of course, is secret.

"One very important feature of this press," said Harn, "is the fact that it prints from special type, but the plates may be used in much of the work. In ordinary offices where general printing is done, plates to print from may be made in a special casting box built for the machine, making the use and manufacture of plates in the usual way a very simple thing. The mode of attaching the special type to the cylinder which will be used in the weather bureau printing offices, on account of only a small amount of type being necessary, is fastened by a series of plates which has been the difficulty to overcome. The secret of fastening the type is still withheld for business reasons until the machine is placed on the market. The scheme of fastening the type is a success in every way."

The machine being so small, in fact, in every way similar to the famous salt-grinding machine of elementary reader fame, it will be mounted on a specially constructed stand. Electric motive power, direct connection, will be used, and will be fitted with all modern rheostatic conveniences.

PEAT DEPOSITS IN THE UNITED STATES.

Peat warms Ireland. It may have to warm a fair portion of the United States before the winter is over, if coal maintains its present exorbitant price. How many persons are aware that between $13,000,000 and $15,000,000 is represented in the capital stock of various companies engaged in gathering, preparing and marketing peat in the United States? Such is a fact.

Enough pure peat has been discovered within a radius of 200 miles of New York to supply the entire country east of the Allegheny mountains with fuel for the next fifty years.

Wisconsin is very rich in peat. The northern peninsula of Michigan is very rich. Minnesota has a fair quantity outside of the river bottom. The Mississippi river bottom in Minnesota is a good illustration of an alluvial peat—that is, it furnishes a material which will burn, but which leaves quite a percentage of ash. There is a good deposit in Idaho. There is a large amount in California, in the central portion of the state, and one large deposit in Yellowstone park. There is a very large deposit in New Jersey; a large amount in Delaware, and another in Florida. In Texas there is a deposit occupying a middle ground between peat and lignite; there is also some pure peat. In Illinois there is a peat bog burning now, which has been burning for fifteen years, and no fire department has ever been able to extinguish it. There is an abundance of peat in the central and western sections of Indiana; one quite large deposit near the home of General Lew Wallace, at Crawfordsville, Indiana. Kentucky and Missouri also have a large amount of peat.

"So he gave you a dog?"
"Yassir," answered Erastus Pinkley.
"He must like you."
"Well, I can't make out foh sho' whether he likes me or whether he don't like de dog."

An exhibition of Hawaiian architecture is to be given at the St. Louis world's fair to disprove the belief that grass huts are the general dwelling houses on the island.

HOW INCANDESCENT LAMPS ARE MADE.

Details of a Process Long Regarded as a Trade Secret.

The manufacture of an incandescent electric lamp is of special interest because many of the operations have heretofore been regarded as trade secrets and carefully kept from the public, says the Practical Engineer.

The delicate filaments which produce the light are formed by squirting a paste made of cellulose (wood pulp) through dies, from which it emerges in the form of fine threads, which when dried are tough and flexible. These threads before they are dry are formed into the desired shape.

They are then packed in carbon dust and submitted to intense heat for many hours. The cellulose is completely charred and the filament now practically consists of charcoal. It is then suspended in an atmosphere of hydrocarbon vapor in a vessel in which a partial vacuum has been made, and a current of electricity sufficient to bring it to incandescense is sent through it. This decomposes the hydrocarbon and a carbon soot somewhat resembling graphite is deposited on the filament. This is techinaclly known as "flashing." After this treatment the filament has a metallic lustre resembling polished steel.

The glass bulbs are blown in molds to secure absolute uniformity, and as they come from the glass house they are perfectly smooth at the rounded end and have a long, open neck. To the rounded end is fused a short length of glass tubing opening into the interior of the bulb. This is subsequently used for connecting the bulb to the exhaust pump.

For making the connection through the glass between the carbon filament and the wire the most satisfactory material is platinum, because it adheres firmly to fused glass and because it expands and contracts at the same rates. If this were not the case, when it got hot through the passage of the current it would either expand more or less than the surrounding glass, and either break it or make a space through which air would leak. So through the little glass stopper which will eventually project down into the neck of the bulb are fused two platinum wires. This stopper, which has a flange at one end, is now called the mount or stem.

Next the filament is fastened to the ends of the platinum which projects from the stem. This is accomplished by means of a special cement which will stand a red heat. Over this paste is deposited a layer of carbon. The paste is then dried in an oven and the stem, with its attached filament, is fastened into the bulb by fusing the flange on its upper end about the neck of the bulb.

After this joint is carefully tested to be sure there are no leaks, the exhaustion of air is accomplished by means of a mechanical air pump, the last traces of gas or air being removed from the bulb by chemical means. When the vacuum is sufficiently high the tube is sealed off by means of a small lamp, leaving the small round tip seen on the spherical end of the finished globe.

The lamp is now practically completed and is sent to the testing department. Here it is subjected to a series of severe tests before it is considered ready for the market. If it passes these successfully the base (the portion by means of which it is screwed into the bracket) is cemented on, and the completed lamp goes to the shipping department.

The new wage scale, binding on the coastwise trade from Newfoundland to the West Indies and Mexico, will benefit 3,500 seamen at the New York port alone. Seamen on vessels of 300 tons or under will receive $25 a month; on vessels over 300 tons and not to exceed 1,500 tons, $30 a month; on vessels over 1,500 tons, $35 a month.

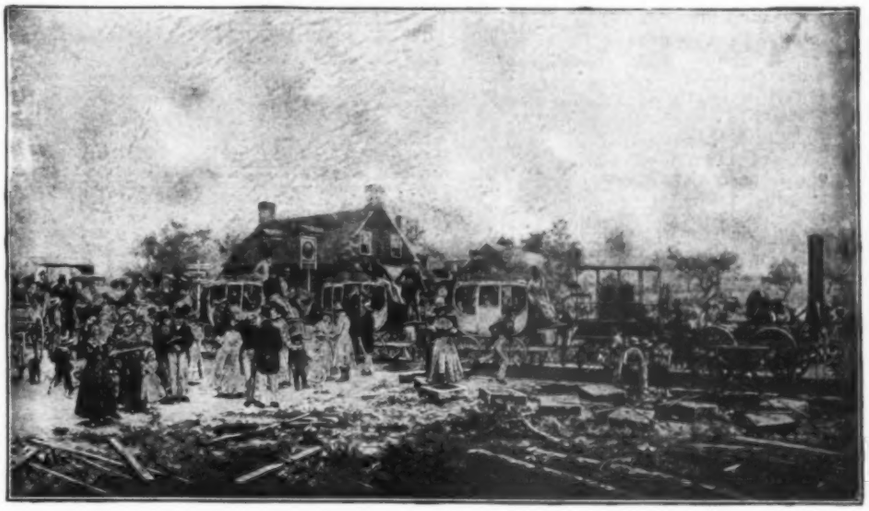
First Passenger Train in America

Thc Original of Our Lines of Palace Cars that Now Pervade the Country

Here is the first real passenger train that was ever run in the United States, about to depart on its first trip for Schenectady, N. Y. The scene is at Old Hickory Inn, two miles from Albany, on the morning of Sept. 9, 1831. It was a galla day at Old Hickory Inn, as may be noticed by the assemblage there and the excitement that is manifest. There was great rivalry among prominent people for the honor of riding on this train, and among its passengers were many whose names now adorn the pages of American history. In the first car rode ex-Governor Yates and Thurlow Weed; in the second car were Joseph Alexander and "Ed" Hayes, the famous high constable of New York. The cars, as will be noticed, are merely stage-coach bodies mounted on trucks.

In looking at the picture and calling to mind the splendid traveling palaces that now sweep through our land in every section we can scarcely realize that such an evolution is possible in 71 years, and then our minds are bewildered with the thought that an equally important change may occur in the next 71 years.

The illustration herewith reproduced is the only one extant showing this first American passenger train. It is through the efforts of Mr. C. Klackner, fine art publisher, 7 West 28th street, New York, and E. L. Henry, the artist, that a pictorial record of this most important event is preserved.



The First Railway Train
By Permission of C. Klackner, 7 West 28th Street, New York.
Copyrighted by E. L. Henry—1894.

The train is on the old Hudson & Mohawk railroad. It was drawn by the locomotive "Dewitt Clinton." David Matthew was the engineer and John C. Clark the conductor. Their names ought to be more familiar to Americans than they are. Mr. Clark may be seen running toward the locomotive with a fish-horn in his hand. Engineer David Matthew is attending to the machinery of the engine.

TO SHIP GULF OYSTERS TO CHICAGO.

Gulf oysters, famed for their fine flavor, but seldom found far from their native beds on account of the difficulty of shipping them, are soon to be plentiful in Chicago and the north. The oysters, which are very large, will be put in cans of various sizes holding from 25 to 100 oysters each. These cans will be sealed and placed in an immense shipping can or metal box which will then be filled full of water. This entire mass will be frozen in an ice factory and the shipping can packed in ice. It is expected the oysters will arrive in fine condition.

Stocking feet are now being sold to save darning.

Use turpentine to clean enameled bath tubs.

CARS TO RUN UNDER WATER

Novel Submarine Railway Designed By an Illinoisan.

Riding in a car as it rolls along under water on a railroad built at the bottom of the stream will be an experience replete with novel sensations when the invention of Alexander Davidson of Joliet, Ill., comes into practical use. The submarine railway system designed by Mr. Davidson is for the purpose of conveying passengers under water for pleasure, to facilitate the study and observations of submarine life and to carry persons across a stream where surface conveyance may for any reason be undesirable. The invention comprises a car for passengers constructed in a water-tight manner and provided with an air chamber to confine under pressure a sufficient quantity of air to supply the needs of the people while sealed up in the car. In the roof of the car is a relief valve, through which the air is allowed to escape when necesary to change the atmosphere of the interior, the valve being adapted to operate automatically when the pressure within the car exceeds the resistance of the valve-spring. Connected with the air-chamber and located within the car is a reducing valve, by means of which the air is admitted to the car at any desired pressure.

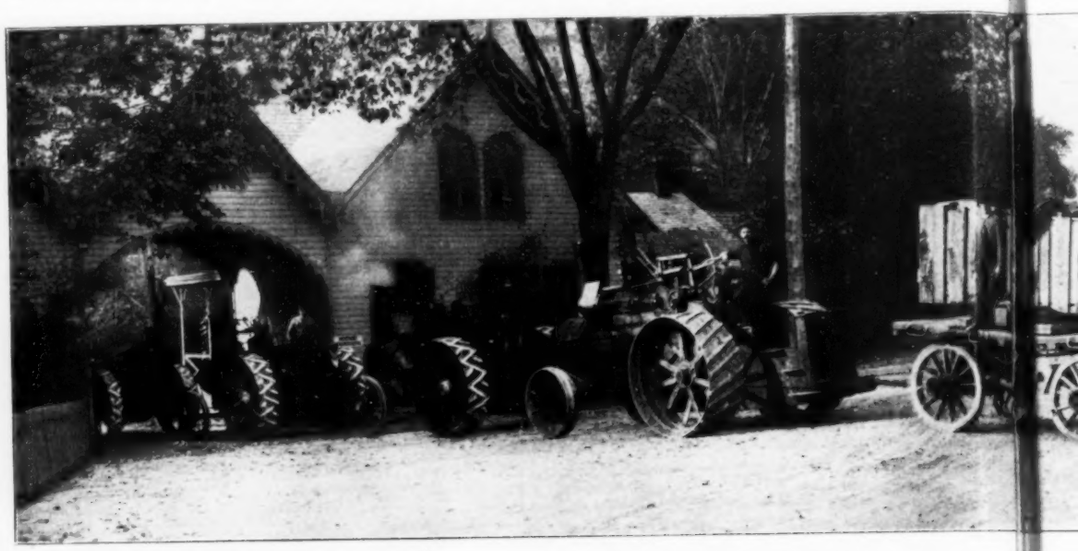
This conveyance runs on a track and is controlled by a cable system, being provided with a signal apparatus to indicate to the engineer on shore when to start or stop the car-propelling mechanism. The passengers enter through a door at the rear. The car is heavily weighted to counteract the effects of the air.

Four Road Engines Haul Great Monument

Gigantic Obelisk 52 Feet High to Commemorate the Deeds of John H. Thomas

Four powerful road engines were required to haul the colossal John H. Thomas' monument to Ferncliff cemetery in Cleveland, where it now stands to perpetually commemorate the deeds of the well-known millionaire manufacturer and philanthropist. On the way to the cemetery the roads were planked to keep the wheels from sinking. On down grades two of the great engines were employed to hold the load back and two to haul it. The monument was thus hauled through the city of Cleveland to the cemetery without the slightest accident.

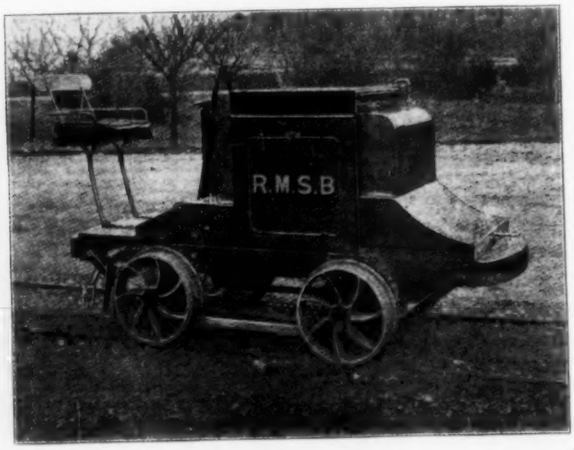
The Monumental News says: "The John H. Thomas memorial is one of the largest spire monuments in the country and is the second largest in Ohio, being exceeded in height only by the John D. Rockefeller monument in Cleveland. It stands 52 feet high from base to apex, and is a plain and stately obelisk. An ornate and pleasing design carved in high relief at the top of the die, is the only ornamentation, and the name of John H. Thomas is the only inscription.



The Spire of the John H. Thomas Monument, When Entering Fern[illegible]

SMALL GASOLINE YARD ENGINE.

A narrow gage yard engine, weighing only 1,500 pounds, has recently been put in service at several plants in England for hauling materials, coal, ashes, etc., about the works. The one shown in the cut is in service for the Richmond Main Sewerage Board, and takes the place of horses. It is mounted on a steel frame, is driven by a pair of vertical gasoline engines (petrol motors, the English call them), which will haul about five tons in a train of small cars, each holding about 3,000 pounds. The motors develop seven horse power, will reverse, and draw the load up a grade of 1 in 30 and around curves of 25-foot radius.



Narrow Guage Patrol Locomotive

AMERICAN VS. ENGLISH RAILWAYS.

Points of Superiority Possessed by Those of Each Country Over the Other.

Herbert W. Horwill, an Englishman who has spent one year in America, in a recent magazine article, declares the English railways to be superior to those of America. His principle reason is that when a person boards a train in England he stands a better chance of reaching his destination alive or without bodily injury. Other reasons alleged are: Greater comfort and convenience; lower fare on fastest trains; lower fare on special excursions; better accommodations in waiting rooms; station platforms on a level with car platforms; greater safety and better care of baggage; better roads and streets.

It is true that the English roads guarantee better protection against accident and loss of life; it is true that the fare on English roads is lower than on American; that they have better accommodations in most of the waiting rooms; that they have the station platforms on a level with the streets, and that they have better roads and streets.

That the English railroads afford greater comfort and convenience to the traveler is not true. The English compartment cars, where the passenger is locked in a tight little room, are regarded as an abomination by Americans who have traveled in Europe. The American traveler is as sure of getting his baggage at the end of his destination; the English passenger must hunt his and identify it. In the matter of speed, England has nothing to compare with the fast trains of America—such as the "Empire State Express," the "Twentieth Century Limited" or the Denver "flyers."

HOW YOUR WATCH GOES WRONG

It is strange how little the average person can account for what seems the whims and caprices of his watch, says Tit-Bits, and yet in the majority of cases they are due to very simple causes.

For instance, the going of most watches varies according to the temperature at which they are kept. Consequently, if you wear a watch next to your body during the day, and at night put it on a cold marble mantelpiece, or, in fact, anywhere in a cold room, the watch is sure either to gain or lose. Cold causes contraction of the metals composing the balance wheel and its parts, and the watch consequently gains. When the parts expand under the heat of the body, the pivots, bearings, etc., tighten up and the watch loses.

Of course, this is not the case with watches having a compensating balance —that is, one made of different metals that both expand and contract under the influence of cold, so that the expansion of the one counteracts the contraction of the other.

Getting the steel parts of one's watch magnetized is another frequent cause of trouble, while changing the position of a watch, such as putting it down horizontally, is also apt to affect its action.

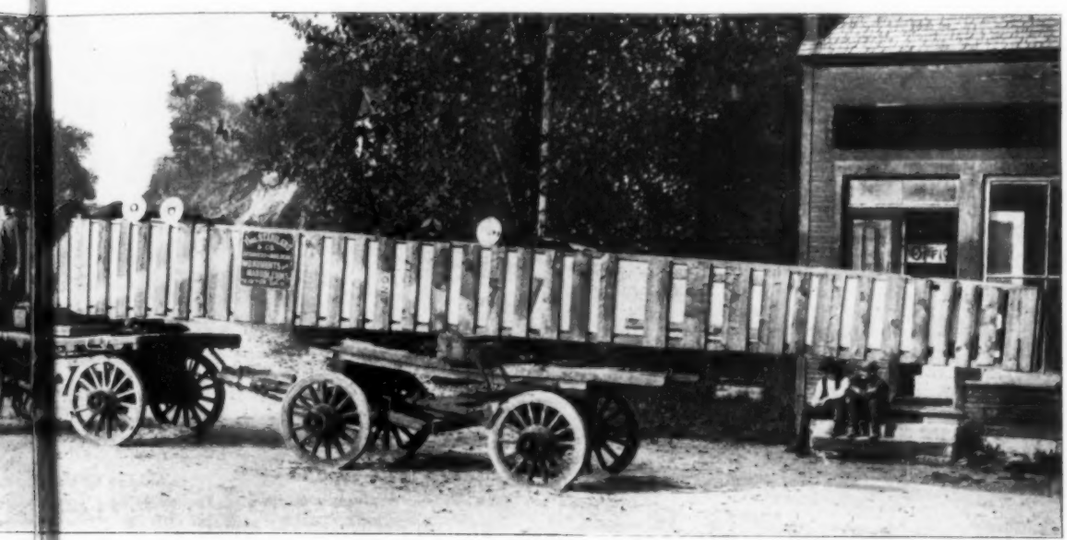
It is well known that a watch will stop for some unexplained reason and go on again if it is given a slight jolt. The same trouble may not recur for years. This is due to the delicate hairspring catching either in the hairspring stud or in the regulator pins. The cause is a sudden jump or quick movement, which gives a jolt to the balance wheel and hairspring, and thus renders the catching possible. The jolt must come at a particular fraction of a second, during the revolution of the balance wheel, otherwise the spring will not catch, and so the odds against this happening are very great.

Women of America have been called on by the Ladies of the Maccabees to contribute a penny each for the building of the Temple of Fraternity at the St. Louis world's fair.

WHOLE TOWN, HOUSES AND ALL, TO MOVE.

Railroad Didn't Come to Benton, Neb., and So Benton is Going to the Railroad.

The village of Benton, Neb., has decided to move. This does not mean the inhabitants alone; but the buildings, houses and stores, besides all the personal effects will float down the Platte river for three miles. Benton was built on its present site many years ago with the expectation that when a railroad came that way it would pass through the town. Finally when a railroad did come it was found impracticable to go nearer than three miles, and as a compensation the officials of the Union Pacific road offered inducements to the people of Benton to move. This was accepted.



Fenn Cemetery, Cleveland, O., Drawn by Four Powerful Traction Engines

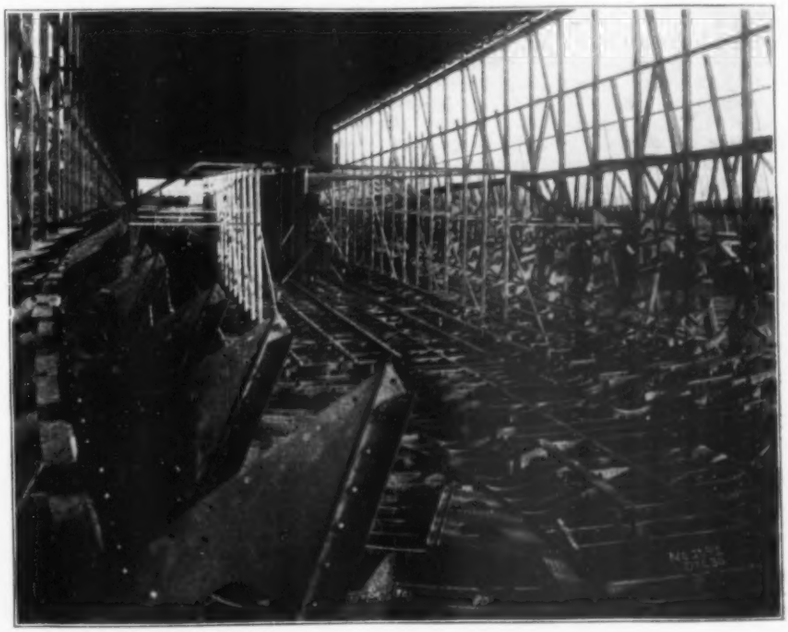
PROGRESS IN CIGARETTE MAKING

A few years ago, when cigarettes were made by hand, a smart girl could manipulate six pounds of tobacco in a ten-hour day, and roll 2,000 cigarettes. Then came the invention of the cigarette-making machine, which a single operator manages with ease. In a day it makes 200,000 cigarettes, thus saving the wages of ninety-nine girls—a sum of very nearly $15,000 a year.

BUILDING OF THE BATTLESHIP NEBRASKA.

The Battleship Nebraska, now being built at Seattle, is to be a model of construction and a powerful addition to the United States navy. She will be of 15,000 tons displacement, will have 18,000 horse power and is designed for a speed of 19 knots an hour. She is to cost $3,733,600. Her main battery will consist of four 12-inch and eight 8-inch breech-loading rifles, and twelve 6-inch rapid-fire guns; secondary battery, six 3-inch, twelve 3-pounder, eight 1-pounder, rapid fire guns and two 3-inch rapid-fire field guns, two machine guns and six automatic.

The work is being done by the Moran Bros. Co. The propelling machinery will consist of two triple-expansion engines. The steam will be supplied by twelve large water-tube boilers, constructed for a working pressure of 250 pounds per square inch. There is to be installed a large electric power plant for lighting and driving auxiliary machinery, chain ammunition hoists, winches, ventilators, fans, etc. The twelve and 8-inch guns will be mounted in balanced turrets, two 12-inch and two 8-inch guns being mounted in a superposed turret on the middle line of the battleship. The remaining 8-inch guns are to be mounted in broadside turrets, a turret on each side.



Interior of the Battleship Nebraska, Now Being Built at Seattle

SHOP NOTES

HOME-MADE WAGON JACK

This jack was patented over 30 years ago by a Mr. Davis of Galt, Ont., but has been in public use since the patent expired. It is widely used in Canada. It is strong, simple and easily handled, says the Ohio Farmer. A is 3x3 in., and 3½ ft. long, and has wooden or iron pins in upper side, the proper distance apart, for axle to rest on. The lever B is of

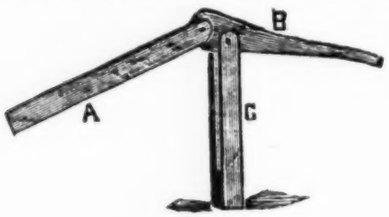


Fig. 1.

FIG. 2.

Easily Constructed Wagon Jack

inch stuff, 6 inches wide where the bolt through the standard is inserted, and 3 ft. 4 in. long. The standard C is 3x3 in. and 2½ ft. long. The arm A is placed under axle, the latter resting on one of the pins, then the lever B is pressed down to position as shown in Fig. 2 and a bolt through B and C (not shown in cut) holds it in place. The distance between the bolts at the upper end of A and B is 5 inches. Put bolt hole through A 1½ inches from the upper edge, and through B 1½ inches from lower edge. Make of tough, hard wood.

A HANDY WRENCH.

The drawing shows a wrench that is said by a correspondent of the Blacksmith and Wheelwright to be the handi-

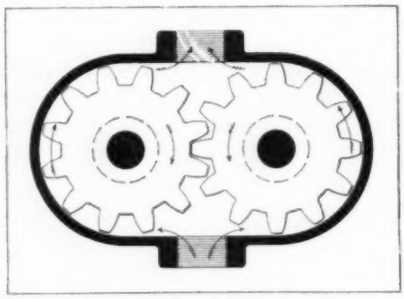
Handy Wrench

est ever used. It is made of ¼x½-inch steel and is 6 inches long. The ends may be made any desired size. In the one shown they were for 3-16-inch and ¼-inch taps respectively.

Accidents in London's streets kill 140 persons a year and injure 5,330.

ROTARY GEAR PUMP.

To circulate water around the cylinders of gasoline engines used in automobiles various methods are employed. One is by means of a "rotary gear"



Rotary Gear Pump

pump, of which the Motor Age says: The "rotary gear" pump is usually driven by a belt or friction pulley from the fly wheel rim, although, if desired, it may be driven by means of gearing. The illustration shows a common form.

The water is drawn into the pump through the lower opening and is carried around in the spaces between the teeth in the direction indicated by the arrows. It is discharged at the upper opening. This style of pump will not lift water or liquids very high, but, like an injector, will force water or liquids effectively.

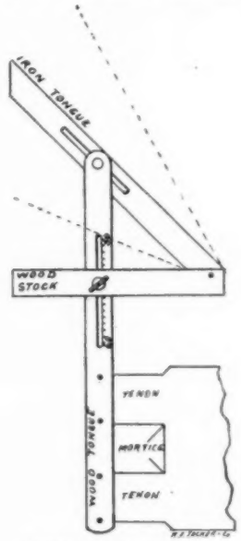
DIAGRAM FOR KEEPING TIME ON A JOB.

The accompanying diagram is recommended by a correspondent of the American machinist as a simple method of keeping time on a piece of work going through the shop. The horizontal lines each represent one man and the vertical lines one day. Thus a single square stands for one man's time one day. The diagrams are of course blank when the job starts and after each day's work is shaded and heavy lines drawn around the number of days in each department. With this explanation the cut is easily understood.

HANDY COMBINATION TOOL.

The sketch shows a neat and handy combination tool. It may be made entire or can be attached to an ordinary bevel. It is useful to millers and draftsmen and is indispensable to millwrights. It is not patented. Any mechanic can make one and can see at a glance how it is made, as well as its advantages, says the American Miller.

In marking off a spout it shows at a glance what pitch the spout will have when up. The stock is neatly mortised to allow the wood tongue to slide either way and always remain square, and is fitted with a thumb-screw to firmly hold the wood tongue at any fixed point. The wood tongue is gauged to show exact pitch of iron tongue when set at any desired angle. In the wood tongue are



Handy Combination Tool

four points for gauging the mortise timber. These are small screws and can be set at any space desired. The stocks acts as a fence while gauging.

When all the steamers are properly equipped with wireless telegraph, passengers can each day get the important news from both sides of the Atlantic.

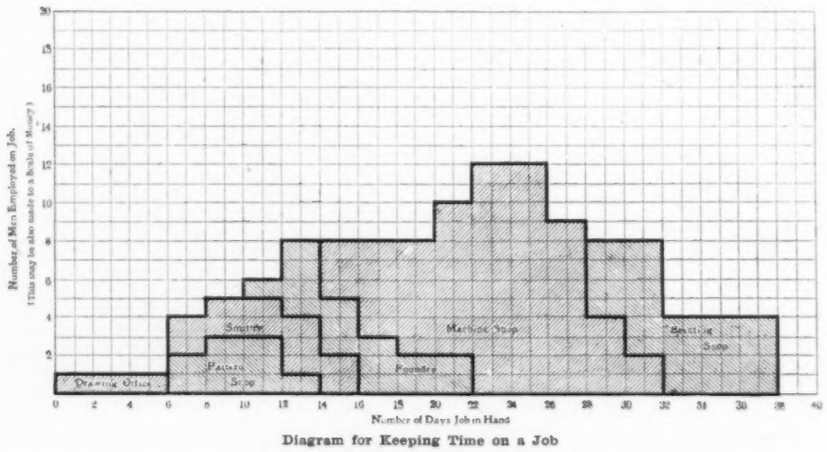
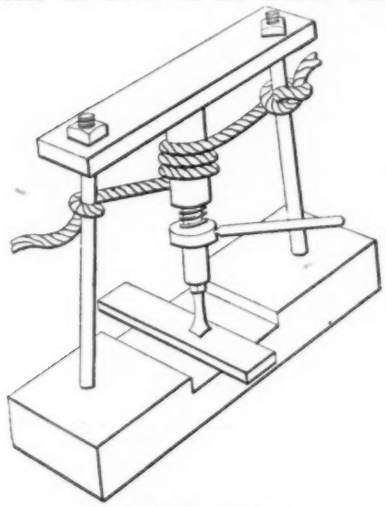


Diagram for Keeping Time on a Job

Berlin theaters have been compelled to use asbestos scenery.

AN AUTOMATIC FEED.

The accompanying sketch is an impressionist view of a scene witnessed from the window of an elevated train by our friend, C. Y. Warman, says the American Machinist. The genius who was manipulating this piece of mechanism had conceived the idea of an automatic feed and arranged it as shown. By taking the required number of turns about the sleeve of the ratchet drill

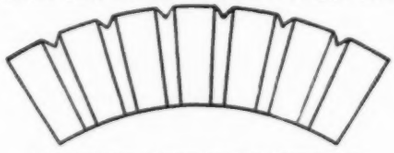


An Automatic Feed

(which required number of turns would be indicated by the behaviour of the drill itself) he was able, by tightening or loosening the rope a little, to get any desired rate of feed, and of course it was automatic. The thing seemed to be working well and is one of those things which are sometimes evolved by men who have little idea of the ingenuity that may have been previously expended upon similar problems.

TO PREVENT FLAT COMMUTATORS.

The accompanying illustration shows the method of treating flat commutators which has been used by Mr. R. M. Howard, manager of the State Electric Co., of Clinton, Ia., which he states is particularly effective for armatures of more than one coil per slot in case of any trouble from flattening or blackening. These difficulties, says the Street Railway Review, are rectified by taking a common three-cornered file and filing out the mica between the bars until the file touches on both bars. Mr. Howard states that he has treated over 200 com-



Showing Way of Treating Flat Commutators

mutators in this way in a number of different shops and localities and the result has been extremely satisfactory in every instance. The mica should be filed out as far as a three-cornered file will reach until it touches the segments on each side.

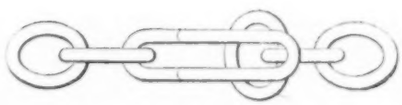
The commutator treated in this way will wear true and bright and will give less trouble from short circuiting than one in which the mica is in the usual condition. The dust does not stay in the slot and as the surface of the mica will measure about twice as much as in the usual way the insulation is higher between bars. An explanation of this may be that many commutators are assembled with too hard a grade of mica and the copper will wear faster than the mica, making the surface uneven and causing flashing and bucking which will ultimately flat the commutator. This method of treating commutators is especially recommended in cases where motors or generators have more than one coil per slot in the armature.

A NEW SAFETY HOOK.

The illustrations show a new safety chain hook which has recently been put on the English market by a manufacturer in Edinburgh. The hook forms a safe coupling for chains or ropes and will not come apart of its own accord when slacked, but can be instantly detached when so desired.

As will be seen, it is extremely simple, consisting of a long link bent into the shape of the letter S flattened. The

Elevation



Plan.

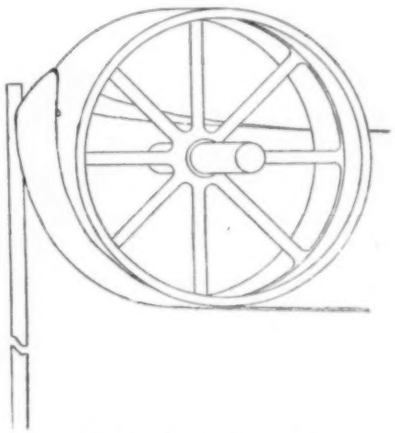
Elevation showing method of fastening.

connection is made by turning the end link of the chain sideways and sliding it over the "safety tongue" of the hook, the second link meanwhile passing parallel to the sides of the hook through the central opening. When once in place no slacking or shaking will dislodge it or cause it to jam, and to uncouple it the second link must again be made to pass exactly up the centre. Its proportions are such that the end link of ordinary close-link chain will fit it, and with open-link chain it can be used on any link, the link beyond the one attached then passing outside the hook, so that the chain may be tightened up to any point, or looped back on itself. It is claimed that the hook is simpler and cheaper than even the ordinary hook, and much more so than any form of spring hook on the market, while it has no parts liable to get out of order. It is also reversible, so that when one end is worn the other can be used.

By the Brussels conference France is prohibited from exporting any more beet sugar. Last year France produced more than 1,000,000 tons of the sugar and used but 450,000 tons.

PUTTING BELTS ON MOVING PULLEYS.

There are times when it is necessary to place a belt on a pulley that is in motion and the man who follows the safe rule of always waiting until the machinery has been stopped before adjusting a belt is not the kind of a person to have about a busy mill.



Putting Belt on Moving Pulleys

It is, of course, advisable that all proper precautions should be observed and the method shown in the accompanying illustration is one that will enable the operative to put a belt on a pulley that is in motion without danger to himself.

The device used consists of a stick of suitable size and strength having an iron rod projecting at right angles near the end. By its use a belt may be readily thrown on a pulley that is running. When the belt is hanging loosely on the shaft it may be caught with the iron projection and easily thrown on the rim of the pulley, when, by pressing it against the rim and pulling, the belt will be drawn up until the pulley will catch it and carry it on as nicely as could be wished. It does not matter particularly whether the pulley is near the floor or at a considerable height, so long as it is within reach of the device.

HARDENING ALUMINUM.

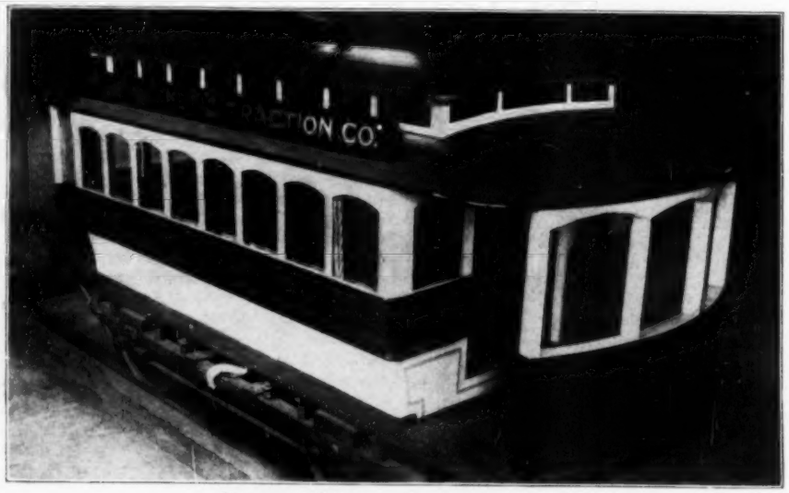
The Deutsche Magnalium Gesellschaft has recently patented a process with the object of increasing the mechanical properties of aluminum. This process opens up a view to the possibility to employ aluminum to new uses in giving it certain qualities of endurance and resistance which is wanting in its pure state. It is well known that aluminum works badly with certain cutting tools and files. It has been shown that the alloying of aluminum and magnesium have a marked superiority over pure aluminum, but less malleable and ductile. The authors observed that if aluminum is allied to 2 to 10 per cent of magnesium the metal obtained is hardly to be distinguished from aluminum; but when this alloy is passed several times through a flatting mill, heated each time towards 400-500 degrees C., its principles are modified. The alloy cuts and files well, as though it were charged with magnesium. It has preserved, on the other hand, the ductility and malleability of pure aluminum.

MAKES GREAT WEIGHT IN LOCOMOTIVES UNNECSSARY

New Invention to Magnetize the Wheel May Mark a New Era in Railway Traffic

Just at the time when the engineering world had paused in the development of the locomotive because the locomotive had reached the limit of possibilities as to weight, there comes to the rescue a new invention that will make great weight unnecessary in the engine's traction power. The invention consists in a remarkable but simple equipment for magnetizing the wheel so that the lightest locomotive will give even greater service in hauling heavy trains than the most gigantic decapods now manufactured. The possibilities of the new device seem bewildering in their scope and the most remarkable thing about it is that no one has made the discovery before. The invention is a product of the brain of A. A. Honey of Tacoma, Wash. Its success, which seems assured, means a new era in steam and street railway development. It means the abolition of the ponderous locomotives that now haul the heavy freight trains up the mountain sides; it means the reinstatement of the thousands of small locomotives that have been retired from service because of their light weight; it means that steep grades are absolutely no hindrance to traffic; it means that the use of sand to gain increased traction will be entirely eliminated; that the steepest inclines will be of no hindrance on electric lines; that street cars may run over snow and ice covered rails without danger or difficulty; that the tonnage of all roads will be increased; that traffic will be both increased and cheapened; that collisions will be made practically impossible as magnetism will hold the car wheel on the track.

Even this is not all. A locomotive fully provided with this magnetic equipment could climb a perpendicular incline; and if the walls and ceiling of a gigantic room were provided with a railway track the locomotive would speed along the track up the sides of the wall and across the ceiling as easily as a fly can perform the feat. All this is due to the magnetic adhesion of the wheel to the rail.



Showing Application on Standard Electric Car

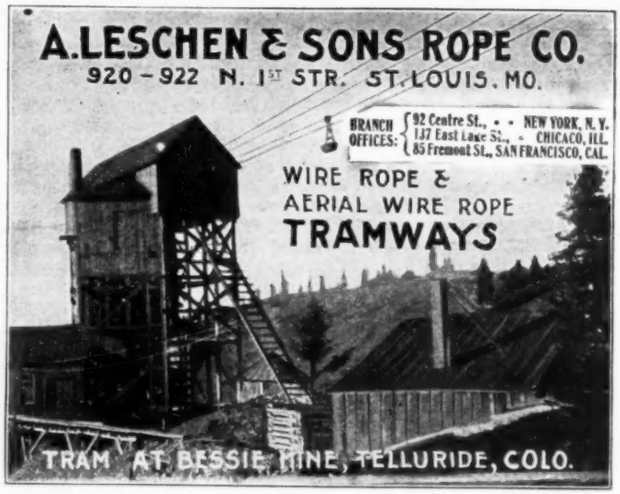
The leading mechanical and engineering publications throughout the country are now devoting columns to the remarkable invention and scientific writers far and near are giving to the public the results of their labors in describing the new device that may mean so much to our future civilization. Here are what some of the publications say:

The Electrical World and Engineer—The magnetic effects produced are somewhat remarkable. An idler wheel is used on the rail just outside the car wheel for completing the magnetic circuit from car wheel to rail and back to the truck frame or axles. The idler is carried on an arm, one end of which has a bearing on the axle just inside the car wheel. This arm has the magnetizing wire wound upon it. The magnetic equipment company of Chicago controls the patent on the apparatus and is about to go ahead with the manufacture of it on a large scale.

The Street Railway Journal—An increase of 350 per cent in the tractive effort of a 15-ton electric motor car with an expenditure of only 2½ horse power in electrical energy is something to make electrical engineers rub their eyes and wonder why the matter was not worked out before. If the experiments with magnetic devices for increasing the traction between rails and car wheels, which are noted elsewhere, are as successful as present appearances would indicate, it is likely to make much difference in the electric locomotive practice of the future as well as in the braking possibilities of the present.

The Railroad Gazette—The great advantage of this device on an electric car would be in starting and stopping, for it adds to the effectiveness of the brake, preventing the wheels from slipping. The latter point is of especial advantage on steep grades. There may also be a provision for throwing the motors in circuit with the device in case the current is lost on the grade as the current generated by the motors will then operate the device and enable the car to be easily controlled. The company is equipping a 40-ton 8-wheel locomotive for experimental purposes and expects to have it ready in a short time."

These are but a few of the columns of comments made on the great new invention. Its operation was demonstrated in the presence of a Popular Mechanics representative at the request of Mr. Sanford Makever & Co., 84 Adams street, Chicago, when it was shown that the device was all that has ever been claimed for it, and probably more.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VOLCANOES FEMININE OR MASCULINE?

A chivalrous and grammatical correspondent writes to implore us to "Get Mont Pelee put right in the London press." The French papers, he assures us, give it with the correct masculine gender. And in this form the mountain stands confessed as the "bald-headed mountain." But the Times atlas prints it as "Mt. Pelee," and there are many mountains which have assumed feminine names. Monte Rosa is an instance, and one could not have a more convincing example than the Jungfrau. But if that erring mountain in the West Indies is really masculine, the London press and the Times atlas owe an apology to womanhood.—London Chronicle.

An exhibition of Hawaiian architecture is to be given at the St. Louis world's fair to disprove the belief that grass huts are the general dwelling houses on the island.

Eating oysters dredged from near sewer outlets in Long Island Sound is ascribed as being responsible for a typhoid epidemic in New Rochelle and other New York suburbs.

LARGEST SERVICEABLE DISC PLOW.

Six Discs in One Frame as Large as Can Be Successfully Made.

As the result of extensive experiments the Kingman plow company has arrived at the conclusion that a 6-disc plow for steam power is as large as can be successfully made in one frame. One of these plows is shown in the accompanying illustration, which also serves to demonstrate the wonderful improvements that have been made in plows of recent years. These disc plows are made in all sizes, for horse or steam power, and can be readily changed from one to more discs without difficulty. A great advantage of this style of disc plow is the simple adjustment of the angle of the disc for plowing different soils. This is done by merely setting out the disc beam, while on some other styles of the plows, washers have to be added or taken from.

6-Disc Plow at Work.

For large steam power engines two 5-disc gangs are found the most successful.

NO MORE LOCUST PLAGUES.

Germ That Will Wipe Out Whole Swarms of Them Has Been Discovered.

A plague to kill a plague is the plan decided on by the United States department of agriculture as a means of destroying the swarms of locusts that sometimes infest the crops. The next time a locust or grasshopper plague prevails in any part of the United States tubes of gelatine containing the germs of the plague will be sent to farmers in the afflicted districts.

It has long been known that when grasshoppers and locusts appear in enormous numbers they sometimes die off as a result of some contagious fungus or bacterial disease. The germs of this plague have been discovered.

The disease is caused by fungi and the cultures are made much more easily than the name would imply. Farmers after using one tube from the department's laboratory may make their own cultures by grinding the dead bodies of infected insects and producing the destructive fungus in as large quanties as they desire.

Berlin theaters have been compelled to use asbestos scenery in future.

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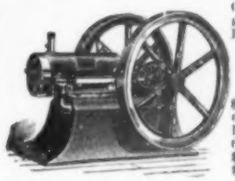

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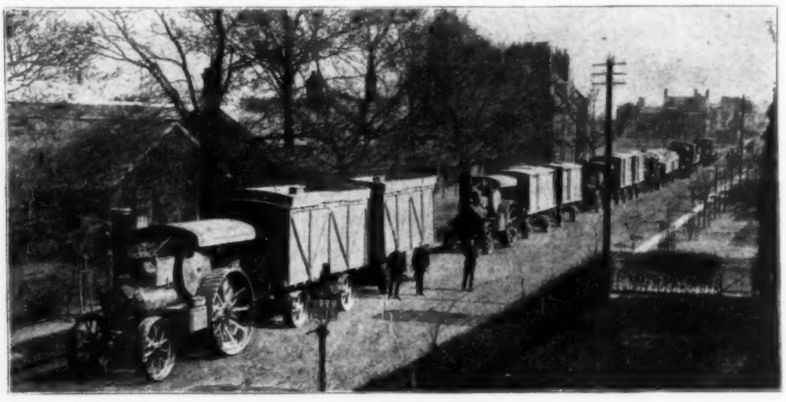
TRACTION ENGINES IN MILITARY WORK.

Cavalry won a victory in the recent war in South Africa, but steam also earned its laurels. This is the first war in which machinery has taken the place of any considerable number of horses and mules, which have always proved a very expensive and troublesome factor in military supplies. The unusual demand makes the animals scarce and costly and the losses in transportation are heavy. After arriving at their destination many of them die from climatic causes and they are always subject to fright and exhaustion. It also requires quite an army of other horses to haul the supplies for those that are engaged in the various kinds of work.

In the Boer war the traction engine was employed to a very large extent and the work performed with them was both satisfactory and surprising. Long trains of supplies and even troops were transported where the roads were good, and smaller quantities of supplies were successfully handled in districts where the roads were very poor, or where there were no roads at all.

One of the illustrations shows these supply trains moving through a city and the other cut shows a traction engine crossing a stream drawing several cars of heavy freight behind. One great advantage which this system affords is that when not in use the motor is not causing any expense, whereas horses have to be fed for weeks and months in order to be ready for use when wanted. At the same time it will probably never be possible to conduct operations on land without using the cavalry, but the traction engine will do the hard every-day work so necessary and important.

Traction Engine Crossing Spruit in South Africa.

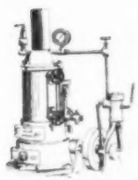


Military Transport Trains for Service in Boer War.

STEAM TURBINES TO LIGHT TRAINS.

Railroads in Germany and Russia are experimenting with storage battery and axle systems of train lighting. Some roads will soon place in service steam turbines on the locomotives which will drive dynamos of requisite capacity for the train's lighting.

Beekeepers stung frequently during two seasons, it is said, subsequently show perfect immunity to the poison and the sting produces no pain.



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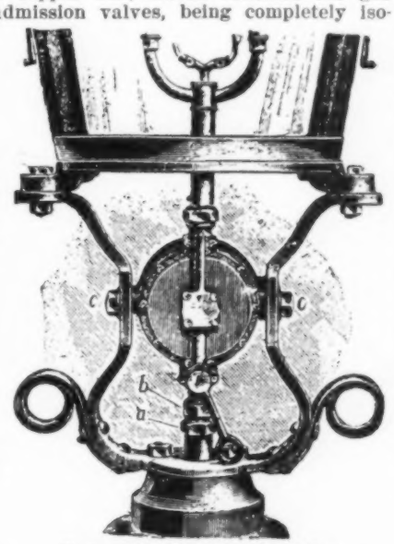
Lamps Lighted by Clockwork

Remarkable Arrangement of Street Illumination in Zurich, Switzerland

In Zurich, Switzerland, there is a clock-work arrangement for lighting and extinguishing gas jets that is attracting much comment. Each lamp is equipped with separate machinery which is wound up like an alarm clock and is operated entirely independent of the other lamps.

La Nature of Paris says: The arrangement is especially interesting because it controls a single lamp or jet or burner. It consists of a clock-work of Superior make, constituted in such a way as to be independent of the temperature. This feature was necessary for apparatus exposed to all kinds of weather. It is enclosed hermetically in a copper box, which contains the gas admission valves, being completely isolated by tight partitions from the clock-work, in order to avoid the chance of explosion. The valves are controlled by movement of the same clock-work. The framework, which is somewhat in the form of a lyre, is so slender as not to cast a shadow. It is fastened together by two bolts, c c, and is connected with the gas-pipe by the threaded mantles a and b.



Clockwork Lighted Lamp in Sweden.

The Keystone says: The clock-work is made to run for twenty days, but it is wound up every two weeks, in order that there may be no inconvenient cessation. As the lamps must be cleaned from time to time, the hours for lighting may be changed on the same visit, modifying a little, as is done in the case of an alarm clock, the unlocking which is to open or close the valve. Consequently the rewinding and the adjustment involve no supplementary expense and there is no lamplighter to pay. The lamps are independent and the hours of lighting and of extinguishment are adapted exactly to the needs of the particular street or locality. If desired, the operation of lighting or extinguishing can be made almost simultaneously for different lamps. The gradual opening of the valve spares the incandescent mantles, and gas becoming gradually ignited as darkness sets in. There are varieties of the system; for example, a single one of the two jets of the lamp may be lighted or extinguished. Some are provided with a key for lighting by hand.

TREVETHICK INVENTED TUNNELING UNDER A RIVER.

The first man who ever invented a method of tunneling beneath the bed of a river, now so popular in New York and Chicago, was the great Cornish engineer, Trevethick. He brought his new plan before the authorities, and was instructed to tunnel under the Thames, from Rotherhithe to Limehouse. He began work in earnest, and in eighteen months had excavated one thousand feet, and was approaching the further shore.

Certain critics said that his tunnel was a foot out of the straight line. It would not have made any serious difference if it had been, but the suggestion made Trevethick, a passionate man, furious. He insisted upon proving himself in the right. He sent his critics out in a boat, over the site of the tunnel, and himself entered the tunnel, armed with a long steel rod. This he pushed up through the roof, to prove that his measurements were accurate. The result might have been foreseen. The water came pouring down through the hole he had made, broke away the roof, and Trevethick had to run for his life. He escaped with great difficulty, the water being up to his neck. The very site of the abandoned tunnel is now almost forgotten.

Women of America have been called on by the Ladies of the Maccabees to contribute a penny each for the building of the Temple of Fraternity at the St. Louis world's fair.

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